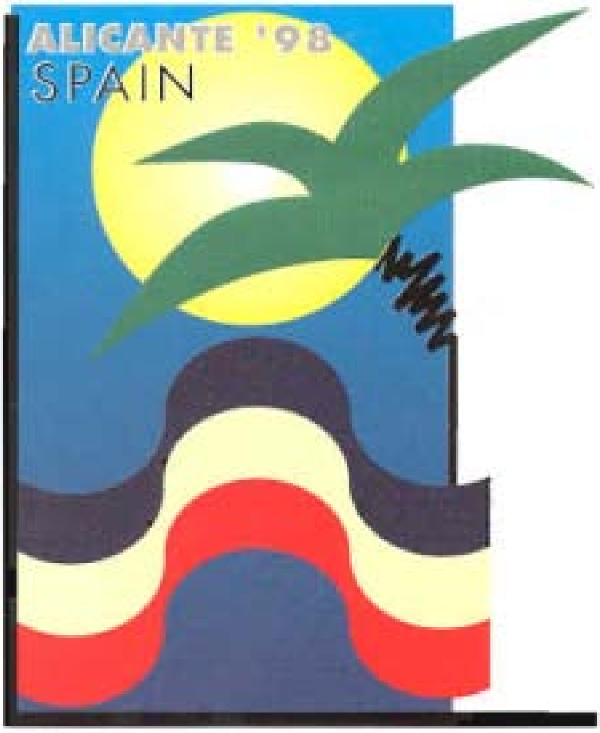

15th INTERNATIONAL SEDIMENTOLOGICAL CONGRESS

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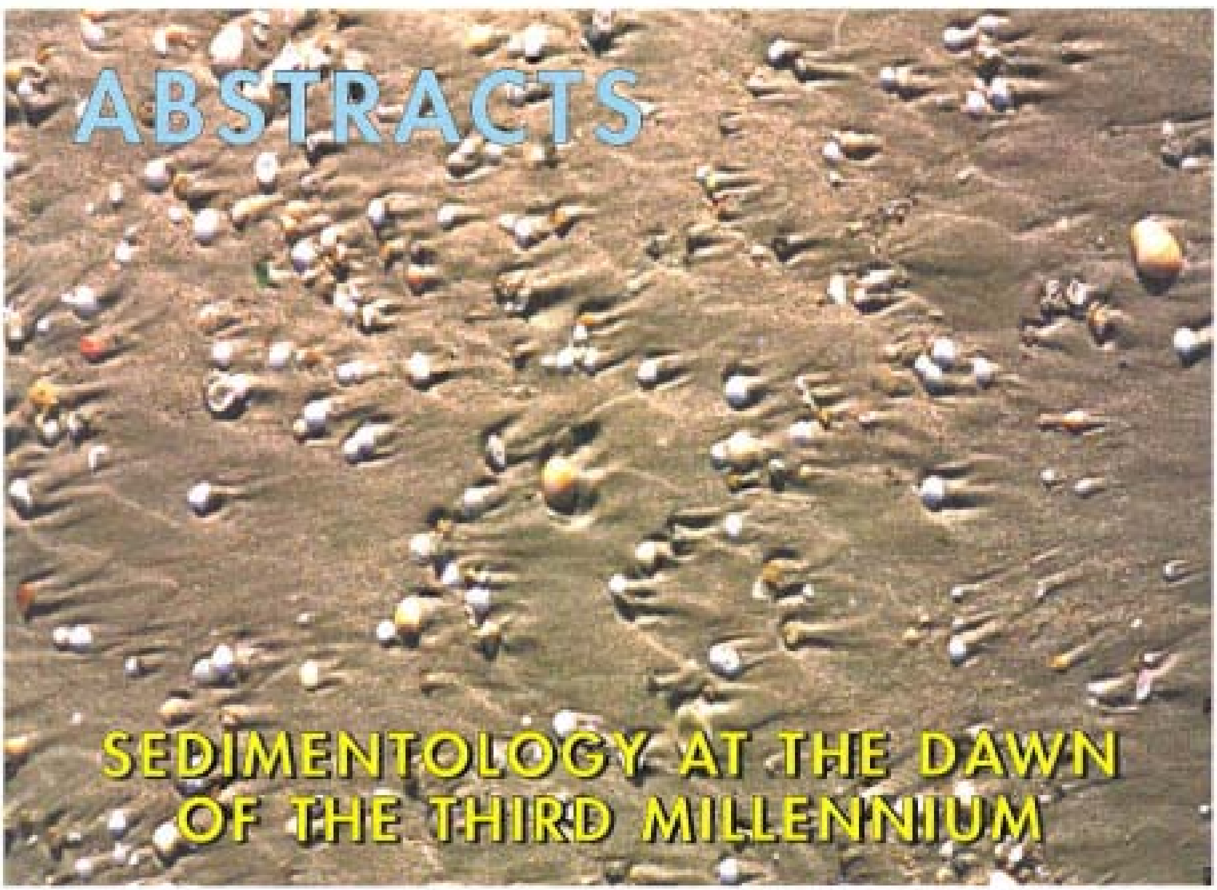

15th INTERNATIONAL SEDIMENTOLOGICAL CONGRESS

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Abstracts

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SCIENTIFIC PROGRAMME ACCORDING TO SESSIONS

THEMES

THEMES A. ANALYTIC TECHNIQUES. DATA PROCESSING AND REPRESENTATION

J. Arribas, J.A. de la Peña & A. Tortosa: Detrital modes in sedimentoclastic sands from first-order streams of the Iberian Range, Spain: the effect of source lithology 153

S.M. Bidart: Artificial laboratory aggregates in sediments 197

M. Canals, B. Alonso, J. Sorribas, M. Farran & Big '95 Team: Coupled swath bathymetry and ultra-high resolution seismic parametric profiling reveal sedimentary processes and allow precise volume calculations of channel-levee complexes 227

M.C. Castellano, G. Nardi, M. Piscitello & M.L. Putignano: Anisatropy of magnetic susceptibility and sedimentological analysis. a multidisciplinary approach to the study of a synorogenic basin 241

R. Chandrajith, H.J. Tobschall & C.B. Dissanayake: Distribution of REEs and selected trace elements in grain size fractions of sediments from Walawe Ganga River, Sri Lanka 250

S. Fernández-Bastero, L. Gago-Duport, O. Pazos, I. Alejo, B. Rubio, D. Rey, S. García-Gil, F. Vilas & A. Santas: Chemical and structural markers of the glaucony maturity. Results from syntheses experiments and XRD Rietveld analysis 328

A.D. Kirkbride, J.L. Best, T. Buffin-Belanger & I. Reid: Monitoring, processing and presenting space-time turbulence data: new opportunities from ultrasonic velocity profiling 473

H. Krawinkel, S.Wozazek, J. Krawinkel & W. Hellmonn: Heavy-mineral analysis and clinopyraxene geochemistry applied to provenance analysis of lithic sandstones from the Azuero-Soná Complex (NW Panamá) 478

S. Montesinos & J. Arribas: Source area versus detrital products: a geographical information system approach 558

C. Reiser, A. Lejay & G. Dromart: Automatic recognition of sedimentary bodies and genetic sequences by analysis of wireline log shape 654

D. Scradeanu, C. Petrache & D. Jipa: Geostatistical analysis of Upper Neogene lacustrine deposits of the Dacian Basin, Romania 708

D. Sherman & E. Farrell: The Charnock relationship for aeolian saltation 719

M. Sirat, A. Aldahan & U. Nordlund: A neural networks approach to predict sedimentation and climate changes in arctic sediment covering last 350ka 725

T. Slomka & E. Slomka: Modal and model sequences in Carpathians flysch sedimentary series using Markov chains analysis 727

D.C. Sousa & H.Vital: Stratigraphic significance of heavy minerals of the sediments from NE Brazil 733

K.-W. Tietze, D. Bannert, F. Böker, F. Diederich, B. Dietrich, M. Karle, F. Lemmer, D. Radies & E. Rose: Macrotidal bedforms as seen in the thermal infra-red 763

M.C. Zuluaga, F. Carcía-Garmilla & J. Arostegui: Different paths of provenance for the Middle Albian Gordexola Formation sediments (Basque-Cantabrian Basin, northern Spain) 851

R. Salas, J. Guimerà, J. Gimènez-Montsant & C. Martín-Closas: Mesozoic rift structure, sedimentation and Palaeogene inversion of the intraplate extensional Maestrat Basin. Iberian Range (NE Spain) 689

Y. Sánchez-Moya & A. Sopeña: Tectonic sequences and fluvial architecture. The Mesozoic onset infill of an extensional basin (Central Spain) 694

A. Schäfer, R.J. Korsch & R. Müller: Permo-Carboniferous Saar-Nahe Basin (Germany), structure and molasse basin-fill 702

Liu Shanyin & Zhong Daloi: Tectono-sedimentary development of Tertiary Basin in Jinggu-Zhenyuan region, SW Yunnan, China 717

A. Siedlecka, V.G. Olovyanishnikov & D. Roberts: Neoproterozoic passive-margin sedimentation along the NE Perimeter of the east Europeon Craton 721

S. Sierra & C. Moreno: Alluvial fans as markers of Viar basin early evolution (SW Spain) 722

S. Sierra, C. Moreno & M.A. Casalvázquez: Petrographic evidences of tecto-sedimentary activity in the Viar Basin (SW Spain) 723

K. Strand: Sedimentory facies and sediment composition changes in o rift/transform margin transition 743

O. Takano: The chonges of depositional systems and sequences in response to basin evolution in a rifted and inverted basin, Central Japan 752

J.H. Ten Veen & G. Postma: Reconstruction of fault block kinematics and architecture of neogene outer-arc basins of central and eastern Crete (Greece) -integration of satellite, topographic and field data into a GIS 758

J.H. Ten Veen, G. Postmo, H. de Boorder, F. Slangen, A. Werre, S. Van Ratingen & V. Unnithan: Reconstruction of fault block kinematics by integration of land-sat, topographic and stratigraphic data into a GIS 759

C. Tiratsoo: Basement uplift and sedimentary basin development in the eastern Betic Cordillera, SE Spain 764

A. Tortosa & J. Arribas: Evolution of sandstone composition in a continental foreland basin. Loranca Basin, Spain 769

M. Tropeano, L. Sabato, P. Pieri & C. Doglioni: Geodynamic and stratigraphic history of the Bradanic Trough (South Apennines Foredeep - Italy) 772

B.R. Turner & K. Thompson: Triassic tectono-stratigraphic events in the main Karoo Basin, South Africa, and their relotion to the Falkland Plateau: a new model for provenance tectonic activity 777

D. Uliçny: Interploy of strike-slip tectanics and eustasy in shallow-marine clastic wedges, Bohemian Cretaceous Basin . 778

A. Valente: Tectono-sedimentary evolution of the Cilento Basin (Italy) 780

A. Voznesensky, A. Knipper, A. Perfiliev, E. Uspenskaya & A. Areshin: Middle to Late Jurassic history of the eostern part of the Mountain Crimean terrain 808

M. Wendarff: Olistostromes in the Lufilian Arc, Central Africa 815

U. Wortmann & H. Weissert: Climate & plate-tectonics: Climate & plate-tectonics: Early Cretaceous sandstane sequences of the western Tethys 825

L. Zitouni, M. Bédim & S. Tlig: Holokinesis and subsurface geology of Mesozoic basins in central Tunisio 845

THEME G. GEOLOGY AND OCEANOGRAPHY OF CONTINENTAL MARGINS

J. Acosto, P. Herranz, A. Muñoz, C. Palomo, M. Pardo de Domlebum & E. Uchupi: Channel geomorphology of Columbretes Island area. Valencia Margin 114

overlying turbidite beds. This syn-sedimentary tectonic activity, although observed only in the basin, may have been responsible for triggering many of the slumps, debris flows and turbidity flows from the upper slope and the shelf edge.

Two possible explanations are discussed. The first is related to the possibility of modification, during deposition, of the basin morphology with a consequent change in the position of paleoslope, and then in the paleocurrent pattern. The second is that the tectonic activity may have affected also the source area by removing clastic input and activating another in a different area.

Further studies should concentrate on paleomagnetic and petrographic analyse to reconstruct the palinspastic position of the nappe, the paleageography of the basin and to assess the location of source areas.

DETRITAL MODES IN SEDIMENTOCLASTIC SANDS FROM FIRST-ORDER STREAMS OF THE IBERIAN RANGE, SPAIN: THE EFFECT OF SOURCE LITHOLOGY

J. Arribas; J. A. de la Peña & A. Tortosa
Departamento de Petrolo

The study of modern clastic deposits in head streams is a chance to isolate parameters involved in the genesis of sediments during their first stage of generation. Here, sediments are 'transport limited' and the litology of the source rocks exerts a dominant influence on generated sediments. Few is written on the effect of sedimentary lithologies as source rocks of elastic sediments and, therefore, few is known on the first stage of production of recycled sediments. This work is carried out on drainage basins from the NW sector of the Iberian Range, where head streams erode Jurassic and Cretaceous sedimentary formations. Drainage basins shape is elongated following the main Alpine structural orientations (E-W, N-S and NW-SE folds and thrusts). The areal extent of these basins ranges from 2 to 8 km^2 and all show similar evolutive stages of the drainage network. The climate of this region is temperate sub-humid with scarce development of inmature soils. Sedimentary lithologies predominate in the sourceland, mainly carbonates and sandstones. Marine limestones with mud-supported textures prevail in the Jurassic section. The Lower Cretaceous strata are dominated by siliciclastics with arkose-subarkose composition, and the Upper Cretaceous by crystalline dolomites. The physiographycal and lithological information of the drainage basins has been analyzed using a GIS (ILWIS, 1.4), and performing a data base with the quantification of these parameters for each drainage basin.

The modern clastic deposits were analysed based on class size distribution of the 8-0.062 mm interval. In terms of the size fraction of modal class, three different groups of sediments have been defined. A first group is characterized by size distributions whose modal class is located in the coarser fractions. These deposits show a good fit with Rosin distribution and correspond with small drainage basins with a dominance of calcareous source rocks. A second group comprises size distributions with modal classes included in the 1-0.25 mm fraction, showing a stronger Gauss tendency. These deposits derived mainly from siliciclastic formations, exhibiting an inherited textural maturity. Finally, the third textural group is constituted by asymmetrical, negatively skewed distributions with modal class in the finer fractions. These distributions occur in deposits with high percentage of coeval carbonate grains generated from present-day tufas and travertines. Petrogrophic data bases consisting of 36 grain types have been elaborated on three sand-size fractions separately (coarse, medium and fine) following pointcounting procedures. Two main petrographic groups of detrital grains can be established: single and compound grains. Single grains consist of any type of grain with a single origin, whereas compound groins show nucleus of clastic material (as single grains) coated by carbonate caeval material. The presence of compound grains is closely related to the presence of coeval carbonate grains. Occasionally, the content of coeval carbonates exceeds 90% of the bulk sediment, obscuring the lithological information of the drainage area. Petrographic analysis af the three sand-sized fractions reveals a great dependence of sand composition on grain size. Medium sand fractions are sedarenites and sub-sedarenites while some coarse fractions show quartzarenite composition. In fine sand fractions the content of coeval carbonate grains, dolospar and feldspar grains increases, reaching occasionally a subarkosic composition. However, micritic limestones, micritic dolostones and compound grains mainly occur in the coarser fractions.

The contrast between both drainage basins (physiographic-lithologic) and sediments (petrographic) data bases provides relevant information about the capability of a specific setting of sedimentary source lithologies to produce sand-sized deposits. As expected there is not a one-to-one ratio between percentages of lithologies in source area and the percentage of their products in the sediment. Sandstones appear as the litology with greater sand generation index (SGI) in any situation in association with carbonate lithologies. Sandstones generate 4 to 20 times more medium sand than limestones in these settings. SGI of sandstones tends to decrease when grain size increases, rising values very close to limestones in coarse sands. Dolomicritic rocks show very low SGI values in any size, whereas dolosparitic facies generate more fine sand. The slope influences on the SGI; however, the control of this parameter on sediment composition is subordinated to the effects of litology, and then their isolation is difficult when drainage basins not offer a wide spectrum of slope values. However, siliciclastic formations seems to be the more sensitive sedimentary Litology to the gradient value, increasing its SGI when this value increases. Finally, the effect of weathering on siliciclastic material can be evaluated comparing the K/Q+K index in sandstone formotions (0.27 - 0.19) ond in the sonds (0.11 - 0.08), representing a decreose in feldspar of 15% aprox. with regard to total siliciclastics grains of the sediment.

COEVAL CARBONATE GRAINS IN MODERN FLUVIAL SANDS (IBERIAN RANGE, SPAIN): THE ACTIVITY OF A CONTINENTAL CARBONATE FACTORY

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Petrographic analysis in head stream sands derived from Mesozoic siliciclastic and carbonate rocks in the Iberian Range show a variable content in coeval carbonate materiol. These components are bioclasts, micritic and sparitic grains and coatings around grains. Generally, their origin is related to the erasion of recent carbonate deposits as cool freshwater tubas, calcimorphic paleasols and speleothems. These carbonate deposits can be mainly associated to carbonate precipitation in a karstic environment developed in severol formations outcropping in the work area. This study is a tentative characterisation of this coeval carbonate material based on a detailed petrographic analysis in coarse, medium and fine sand fractions.

The presence of coeval carbonate grains in the sediments produces an increose in volume of the finer sand fraction, where these components tend to concentrate. Occasionally their content constitute more than 90% of sediment volume in this fraction. Whereas siliciclastic and carbonate grains derived from the parent rocks prevail in the coarse sand fraction. These grains show abundant coatings of coeval carbonate with variable textures.

Textural and compositianal criteria permit to describe four categories of coeval carbonate grains: micritic, sparitic, coated and bioclasts. The most frequent coevols are micritic grains which show a spongy and porous microstructure, sometimes preserving isolated algal filaments or algal colonies of fan-like character. The origin of these coeval grains ore ossociated to the erosion of recent tufa deposits. Also laminated micritic grains occur os ancolite (coated groins) or stromatolite remains. Other kind of micritic coeval are paleasol frogments which are recognised as hard micritic grains. The sparite grains are abundant and generally are the result of algal micrite sparitization. These grains can preserve a fan-like microstructure formed by algal filaments (similar to those described in micritic grains) or a prismatic and radial microstructure thot characterises *Microcodium* colonies. In addition, sparite grains without microstructure appear like isolated or cluster crystals with an uncertain origin. The coated grains are very common and are constituted by a nucleus plus a caoting of coeval corbonote (micritic and/or sparitic coatings). When the nucleus correspond to extrabasinal groins, os quartz, feldspar or carbonate rock fragments, this kind of grain had been named as *compound groins* (Arribas *et al.*, in this meeting), and when the nucleus ore intrabasinal in origin we have named os *cooted coevol groins*. Coatings are formed by micritic or sparitic carbonate in as single or multisteady envelopments and their origin is related with algal activity that may form olgol-mots on the chonnelized deposits. The identified bioclasts ore charophytes (stems and small reproductive gyrogonites) and gostropods.

Although these coeval components hove been well defined in basis on textural and compositional criteria, some problems exist when grains with different origin show similar microfabrics. This convergence of microfabrics is common in grains with a laminated microstructure os: debris of stromatalites, oncolites, rhizocretions and speleothems. In addition, early diagenetic processes as cementation or recrystallization, are very frequent in continental environments. These processes may produce an increase of crystal size of carbonate deposits, and then may provide coeval grains with very similar textures to those grains derived from carbonate source rocks. This problem is greatly dramatised in petrographic analysis carried out on ancient sandstones deposits, when general diagenesis mask the primary textures. Classically, authors hove used textural ond compositional criteria as: coeval bioclasts, soft appearance, irregular contours, groin-size coarser than the detrital grains and lack of recrystallization and cementation processes to identify intrabosinal grains in ancient deposits. These studies underestimate the presence of coeval carbanate groins affected by early recristallization and cementation. Probably these groins were considered as false extrabasinal components.

Also in the fine fraction on important accumulation in micritic groins without microstructure occur os consequence of the loss of textural characters when groin size decreases. For these reasons is advisable the analysis of textures of coeval carbonate material in coarse fractions.